

Review of *Dicrotendipes* Kieffer from China (Diptera, Chironomidae)

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Abstract

The genus *Dicrotendipes* Kieffer from China, including 8 species, is reviewed. Two new species, *D. nudus* **sp. n.** and *D. saetanumerosus* **sp. n.** are described and the male imagines are illustrated; the record of *D. fusconotatus* (Kieffer) is the first for China. A key to the males of *Dicrotendipes* in China is given.

Keywords

Chironomidae, *Dicrotendipes*, new species, key, China

Introduction

The genus *Dicrotendipes* was erected by Kieffer in 1913, with *Dicrotendipes septem-maculatus* (Becker, 1908) as type species. Adults of *Dicrotendipes* have been considered as pests due to large emergences (Frommer and Rauch 1971; Epler 1988), and have been implicated in allergic reactions in humans in Africa (Cranston et al. 1983). The immature stages are found in both lentic and lotic habitats, but are generally more prevalent in lentic situation. So far, there are 102 species recorded around the world.

In this paper, the Chinese material of *Dicrotendipes* is reviewed. Two new species are described, and a key to the Chinese species of *Dicrotendipes* is presented.

Materials and methods

The morphological nomenclature follows Saether (1980). The material examined was mounted on slides, following the procedure outlined by Saether (1969). Measurements are given as ranges followed by the mean, when three or more specimens are measured, followed by the number of specimens measured (n) in parentheses. Specimens are deposited in the College of Life Science, Nankai University, China and College of Life Science, Taizhou University, China.

Abbreviations of parts measured are as follows:

| | |
|---|---|
| TL | Total length, Length of abdomen + length of thorax; Abdomen is measured from the concave anteriomedian margin of segment I to the apex of the gonostylus; the thorax is measured from the posterior margin of the postnotum to the anterior apex of the scutum in lateral view. |
| WL | Wing length, measured from arculus to apex of wing. |
| Pfe | Length of profemur. |
| AR | Antennal ration, length of 11 th / length of flagellomeres 1–10. |
| L: 5th/3rd | Length of the 5 th Palpomere / length of the 3 rd Palpomere. |
| Ftu | Length of frontal tubercle. |
| VR | Venarum ration, length of Cubitus (Cu) / length of Media (M). |
| BV | Length of (femur + tibia + ta ₁) / length of (ta ₂ + ta ₃ + ta ₄ + ta ₅) |
| LR | Leg ration, length of ta ₁ / length of tibia. |
| SV | Length of (femur + tibia) / length of ta ₁ . |
| HR | Hypopygium ration, length of gonocoxite / length of gonostylus. |
| HV | Hypopygium value, total length / length of gonostylus times ten. |
| P₁ | Fore leg. |
| P₂ | Mid leg. |
| P₃ | Hind leg. |
| fe | femur. |
| ti | tibia. |
| ta₁...ta_n | tarsus ₁ ...tarsus _n . |
| B | Brachiolum. |
| R | Radius. |
| R₁ | Radius 1 vein. |
| R₄₊₅ | Radius 4+5 vein. |

Taxonomy

Dicrotendipes flexus (Johannsen, 1932)

http://species-id.net/wiki/Dicrotendipes_flexus

Chironomus (*Limnochironomus*) *flexus* Johannsen, 1932: 530.

Limnochironomus flexus: Lenz 1937: 6.

Dicrotendipes flexus: Hashimoto et al. 1981: 14; Epler 1988: 128; Wang et al. 1990: 29; Wang 2000: 643.

Specimens examined. China, Hubei: 5♂♂, Wuhan City, Donghu Lake, 30°35.06'N, 114°22.42'E, 22.iv.1977, Wang SD sweeping method; Guangdong: 2♂♂, Fengkai County, Heishiding Nature Conservation Area, 23°29.14'N, 111°50.54'E, 18.iv.1988, Wang XH, light trap; Shandong: 1 ♂, Yantai City, Kunyu Mountain, 37°23.53'N, 121°36.42'E, 24.viii.1987, Wang XH, sweeping method.

Remarks. *D. flexus* (Johannsen) closely resembles *D. nervosus* (Staeger) in the structure of hypopygium, but can be separated by the apparently disjunct distributions and fewer setae on R and R₁, (21–26 in *D. flexus*, more than 35 in *D. nervosus*). All examined Chinese specimens comply with the description of Johannsen (1932) and Hashimoto et al. (1981).

Distribution. China (Hubei, Guangdong and Shandong Province); Australia; Japan; Indonesia.

Dicrotendipes fusconotatus (Kieffer, 1922)

http://species-id.net/wiki/Dicrotendipes_fusconotatus

Calochironomus fusconotatus Kieffer, 1922: 68.

Calochironomus griseonotatus Kieffer, 1922: 69.

Dicrotendipes forkficula Kieffer, 1925: 298.

Dicrotendipes nilicola Kieffer, 1925: 300.

Chironomus (*Dicrotendipes*) *fusconotatus*: Freeman 1957: 362.

Dicrotendipes fusconotatus: Contreras-Lichtenberg 1986: 717.

Specimens examined. China, Jiangxi: 5♂♂, Yongxiu County, Nanji Town, 28°56.42'N, 116°21.37'E, 12.vi.2004, Yan CC, light trap.

Remarks. Chinese specimens mainly agree with the description of Freeman (1957), but vary in the coloration of the abdomen: the abdomen of the Chinese species is black; while in Freeman (1957), the abdomen is light green and the median of each abdominal tergite black.

Distribution. China (Jiangxi Province); Belgium; Congo; Egypt; Israel; Kenya; Sudan; Zaire.

Dicrotendipes nervosus (Staeger, 1839)

http://species-id.net/wiki/Dicrotendipes_nervosus

Chironomus nervosus Staeger, 1839: 567.

Tendipes (*Dicrotendipes*) *nervosus*: Dendy and Sublette 1959: 514.

Chironomus (*Dicrotendipes*) *nervosus*: Sublette 1964: 126.

Dicrotendipes nervosus: Epler 1988: 63; Wang et al. 1990: 29; Wang 2000: 643.

Specimens examined. China, Jiangxi: 7♂♂, Yongxiu County, Nanji Town, 28°56.42'N, 116°21.37'E, 12.vi.2004, Yan CC, light trap; Ningxia: 3♂♂, Yinchuan City, 38°29.23'N, 106°13.19'E, Wang XH, light trap; Shandong: 2♂♂, Zaozhuang City, Baodugu Mountain, 34°59.11'N, 117°43.07'E, 28.v.1994, Wei MC, sweeping method; Tianjin: 6♂♂, Yuqiao Reservoir, 40°02.35'N, 117°27.01'E, 17.x.1987, Wang XH, light trap; Zhejiang: 1♂, Quzhou City, Yunxi village, 29°01.15'N, 118°56.51'E, 20.iv.2011, Lin XL, sweeping method.

Distribution. China (Jiangxi, Shandong, Zhejiang Province, Ningxia Hui Autonomous Region and Tianjin City); Brazil; Britain; Canada; Denmark; Germany; Japan; Netherlands; Korea; Sweden; Russia; USA.

***Dicrotendipes nudus* sp. n.**

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http://species-id.net/wiki/Dicrotendipes_nudus

Figs 1–5

Diagnosis. R_1 and R_{4+5} without seta; tergite IX without median seta; anal point with basal peduncle and bulbous ventral extension, 6–9 dorsal basal setae and 6 lateral setae.

Description. Male imago (n = 18)

TL 2.65–3.20, 2.95 mm. WL 1.65–2.00, 1.82 mm. TL/WL 1.58–1.94, 1.72. WL/Pfe 2.14–2.43, 2.31.

Coloration. Head, thorax and abdominal tergite VI–IX brown, abdominal tergite I–V pale yellow; legs yellowish-brown.

Head. AR 1.85–2.12, 2.02. Temporal setae 10–16, 13. Clypeus with 12–19, 16 setae. Tentorium 100–163, 146 μm long, 20–35, 28 μm wide. Palpomere lengths (in μm): 34–42, 35; 43–55, 48; 40–45; 108–130, 121; 130–148, 138; 163–215, 179. L: 5th/3rd 1.35–1.67, 1.58. Frontal tubercle 10.20–17.50, 14.20 μm long, 5.00–7.50, 6.20 μm wide.

Wing (Fig.1). Wing transparent, without markings. VR 1.11–1.16, 1.13. B 1–3, 2 setae; R with 7–11, 9 setae; R_1 and R_{4+5} without seta. Squama with 4–6, 5 setae.

Thorax. Dorsocentrals 8–11, 10; acrostichals 4–5, 4; prealars 3–4, 4. Scutellum with 4–9, 7 setae.

Legs. Fore tibia with rounded scale lacking spur. Spurs on mid tibiae 23–25, 24 μm and 18–25, 20 μm long, including combs 26–32, 30 μm and 26–32, 30 μm long; spurs on hind tibia 22–32, 26 μm and 18–20, 19 μm long including combs 24–28, 26 μm and 22–25, 23 μm long. Width at apex of front tibia 53–58, 55 μm , of mid tibia 50–55, 53 μm , of hind tibia 55–65, 59 μm . Lengths (in μm) and proportions of legs in Table1.

Hypopygium (Figs 2–5). Anal point 40–60, 50 μm long, with basal peduncle and bulbous ventral extension, 6–9 dorsal basal setae and 6 lateral setae. Tergite IX without

Table 1. Lengths (in μm) and proportions of legs of *Dicrotendipes nudus* sp. n.

| | P_1 | P_2 | P_3 |
|-----------------|-----------------|-----------------|-----------------|
| fe | 710–850, 788 | 670–790, 752 | 770–870, 818 |
| ti | 560–640, 600 | 570–710, 638 | 800–940, 870 |
| ta ₁ | 890–1050, 991 | 310–380, 338 | 490–560, 528 |
| ta ₂ | 380–460, 428 | 180–220, 197 | 260–300, 278 |
| ta ₃ | 310–380, 353 | 110–140, 127 | 210–240, 218 |
| ta ₄ | 240–300, 280 | 70–80, 77 | 110–130, 123 |
| ta ₅ | 130–150, 143 | 71–83, 77 | 90–100, 95 |
| LR | 1.59–1.75, 1.65 | 0.52–0.55, 0.53 | 0.59–0.64, 0.61 |
| BV | 1.89–2.04, 1.96 | 3.45–4.87, 3.84 | 3.06–3.19, 3.11 |
| SV | 1.32–1.43, 1.37 | 4.03–4.17, 4.11 | 3.08–3.29, 3.20 |

median setae; laterosternite IX with 3–4, 3 setae. Phallapodeme 95–103, 97 μm long; transverse sternapodeme 40–50, 45 μm long, laterally narrowed, medially broad, inverted U-shaped. Gonocoxite 142–165, 156 μm long. Superior volsella 83–92, 85 μm long, 23–27, 25 μm wide; digitiform with short ventral extension; with numerous micro setae and 3–4 short apical setae (Figs 4–5). Inferior volsella 128–155, 142 μm long; elongate, apex bulbiform, with 6–9, 8 apical setae in 2 rows. Gonostylus 150–195, 172 μm long; slightly curved medially, with 5–7, 6 apical setae along inner margin. HR 0.73–1.17, 0.82; HV 1.82–1.88, 1.85.

Type materials. Holotype: 1♂, China, Hebei: Chicheng County, 40°54.16'N, 115°54.08'E, 21.vii.2001, Guo YH, light trap. Paratypes (17): Hebei: 2♂♂, Chicheng County, 40°54.16'N, 115°54.08'E, 21.vii.2001, Guo YH, light trap; Xinjiang: 5♂♂, Hebahe County, 48°04.30'N, 86°24.47'E, 15.vii.2002, Tang HQ, light trap; Zhejiang: 3♂♂, Ningbo City, 29°48.36'N, 121°34.53'E, 10.v.2010, Qi X, sweeping method; 1♂, Sanmen County, 29°05.55'N, 121°23.45'E, 28.vii.2010, Lin XL, sweeping method; 6♂♂, Tiantai County, Huading Mountain, 29°14.51'N, 121°06.31'E, 13.iv.2011, Lin XL, light trap.

Etymology. The species name is from Latin, *nudus*, meaning bare, referring to R_1 and R_{4+5} without seta, which is unique within the genus.

Remarks. *D. nudus* closely resembles *D. nervosus*, but can be separated by R_1 and R_{4+5} of *D. nudus* without seta; while in *D. nervosus*, R_1 with 11–20, 15 setae, R_{4+5} with 17–28, 22 setae.

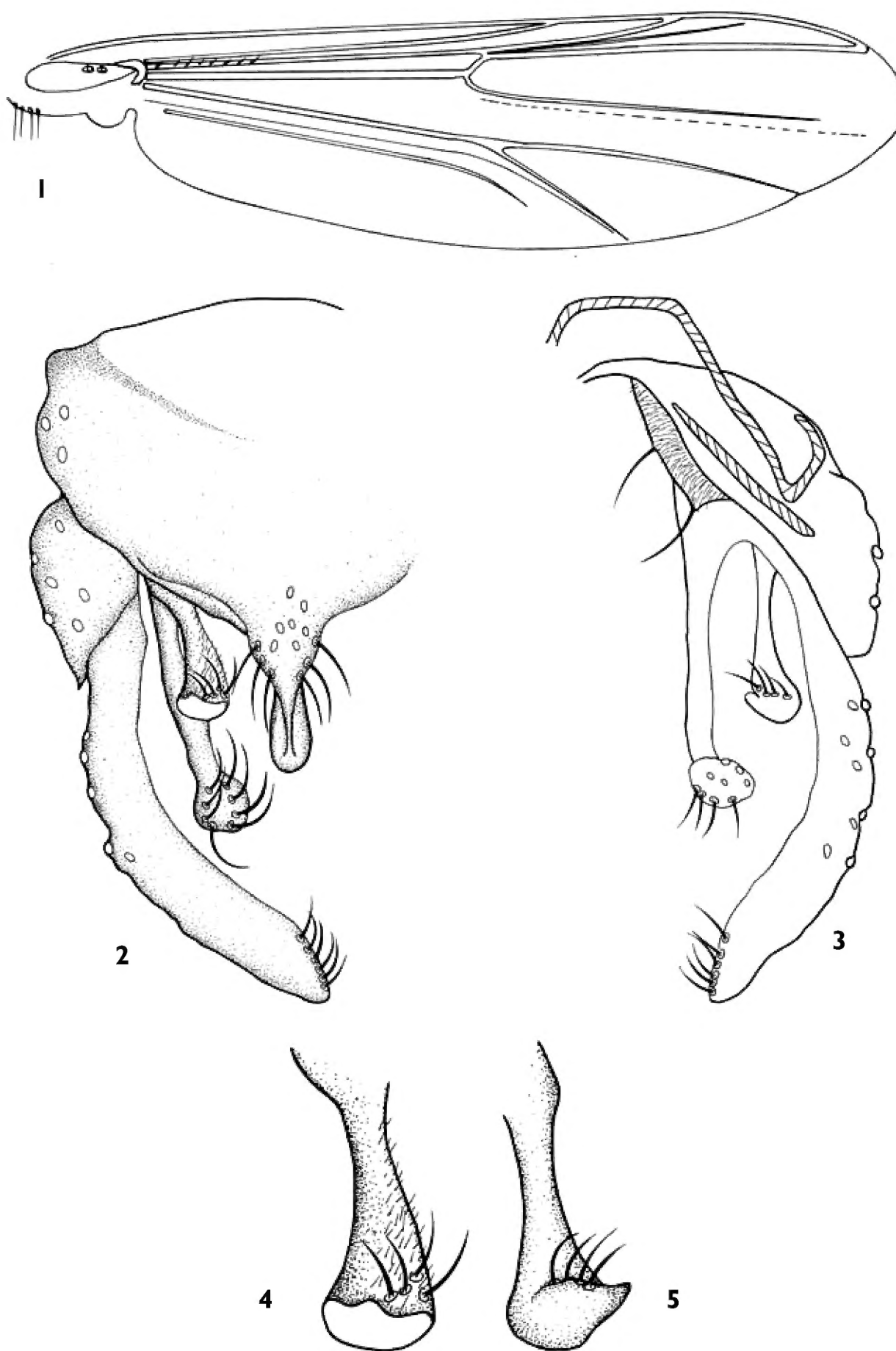
Distribution. The species is known from Hebei, Zhejiang Province and Xinjiang Uygur Autonomous Region of China.

Dicrotendipes pelochloris (Kieffer, 1912)

http://species-id.net/wiki/Dicrotendipes_pelochloris

Tendipes pelochloris Kieffer, 1912: 39; Kieffer 1916: 113.

Limnochironomus niveicauda Kieffer, 1921: 585.



Figures 1–5. *Dicrotendipes nudus* sp. n., male **1** wing **2** hypopygium (dorsal view) **3** hypopygium (ventral view) **4–5** superior volsella.

Chironomus (*Limnochironomus*) *niveicauda*: Johannsen 1932: 528.

Dicrotendipes niveicauda: Sublette and Sublette 1973: 404; Hashimoto et al. 1981: 13.

Chironomus inferior Johannsen, 1932: 534.

Cladotendipes inferior: Lenz 1937: 7.

Dicrotendipes inferior: Sublette and Sublette 1973: 403.

Chironomus (*Dicrotendipes*) *wirthi* Freeman, 1961: 692.

Dicrotendipes pelochloris: Epler 1988: 134; Wang et al. 1990: 28; Wang 2000: 644.

Specimens examined. China, Hainan: 2♂♂, Xinglong County, Huaqiao Farm, 18°43.27'N, 110°14.42'E, 21.v.1985, Wang XH, light trap; Hebei: 1♂, Qinhuangdao City, 39°55.53'N, 119°36.19'E, 4.vi.1985, Li HH, sweeping method; 3♂♂, Chicheng County, 40°54.16'N, 115°54.08'E, 21.vii.2001, Guo YH, light trap; Jiangxi: 2♂♂, Yongxiu County, Nanji Town, 28°56.42'N, 116°21.37'E, 12.vi.2004, Yan CC, light trap; Fujian: 11♂♂, Shanghang County, 25°02.32'N, 116°26.12'E, 6.v.1993, Wang XH, light trap; 2♂♂, Longyan City, 25°07.14'N, 117°02.20'E, 25.ix.2002, Liu Z, light trap; Guangxi: 4♂, Leye County, 24°47.30'N, 106°33.47'E, 24.vii.2004, Yu X, light trap; Guizhou: 2♂♂, Guiyang City, Huaxi, 26°24.32'N, 106°38.58'E, 23.vii.1995, Bu WJ, sweeping method; Taiwan: 2♂♂, Taipei City, 25°08.33'N, 121°36.57'E, 21.vii.2003, Wang XH, light trap.

Remarks. The Chinese specimens mainly agree with the description by Epler (1988). According to Epler (1988), there was some variation in the coloration of the wing in *D. pelochloris*, from hyaline to dusky brown, or with diffuse brown cloud along R_1 , R_{4+5} , M, Cu and An. The wings of Chinese specimens are hyaline, without markings. The Chinese specimens are smaller than the specimens described in Epler (1988). Some measured differences between the Chinese specimens and the specimens described by Epler (1988) are shown in Table 2.

Distribution. China (Hainan, Hebei, Fujian, Guizhou, Jiangxi, Taiwan Province and Guangxi Zhuang Autonomous Region); Australia; India; Indonesia; Japan; Pakistan; Philippines; South Korea.

Table 2. Differences between the specimens of China and of Epler (1988)

| | Chinese specimens | Description of Epler (1988) |
|-----------------|--------------------|-----------------------------|
| TL | 2.68–4.25, 3.55 mm | 3.74–4.40, 4.01 mm |
| WL | 1.38–2.43, 1.82 mm | 1.73–2.28, 1.96 mm |
| Ftu | 13–33, 19 µm | 16–26, 20 µm |
| AR | 1.91–2.44, 2.17 | 1.95–2.27, 2.09 |
| VR | 1.05–1.14, 1.10 | 0.81–0.92, 0.85 |
| LR ₁ | 1.58–1.84, 1.73 | 1.66–2.07, 1.86 |
| BV ₁ | 1.71–2.75, 1.87 | 1.78–1.98, 1.89 |
| BV ₂ | 3.66–4.27, 3.89 | 4.06–4.74, 4.22 |
| SV ₂ | 3.72–4.17, 3.97 | 3.98–4.38, 4.17 |

***Dicrotendipes saetanumerosus* sp. n.**

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http://species-id.net/wiki/Dicrotendipes_saetanumerosus

Figs 6–8

Diagnosis. Tergite IX with more than 30 median setae; anal point broad, bare; superior volsella pediform, with 11–16 lateral setae.

Description. Male imago (n = 7)

TL 3.65–4.30, 3.82 mm. WL 1.80–2.30, 2.10 mm. TL/WL 1.87–2.03, 1.93. WL/Pfe 1.86–2.04, 1.96.

Coloration. Head, thorax and abdominal tergite VII–IX brown, abdominal tergite I–VI pale yellow; legs yellowish-brown.

Head. AR 2.38–2.55, 2.40. Temporal setae 19–22, 20. Clypeus with 16–20, 17 setae. Tentorium 120–155, 136 μ m long, 26–35, 30 μ m wide. Palpomere lengths (in μ m): 32–53, 45; 58–68, 62; 155–185, 167; 165–195, 172; 235–260, 241. L: 5th/3rd 1.41–1.52, 1.46. Frontal tubercle 7.50–15.00, 10.00 μ m long, 5.00–6.50, 5.52 μ m wide.

Wing (Fig.6). Wing transparent, without markings. VR 1.05–1.06, 1.05. B 2–3, 2 setae; R with 17–20, 18 setae; R₁ with 12–16, 14 setae; R₄₊₅ with 17–19, 18. Squama with 4–9, 6 setae.

Thorax. Dorsocentrals 8–11, 10; acrostichals 9–16, 12; prealars 4–5, 4. Scutellum with 8–11, 9 setae.

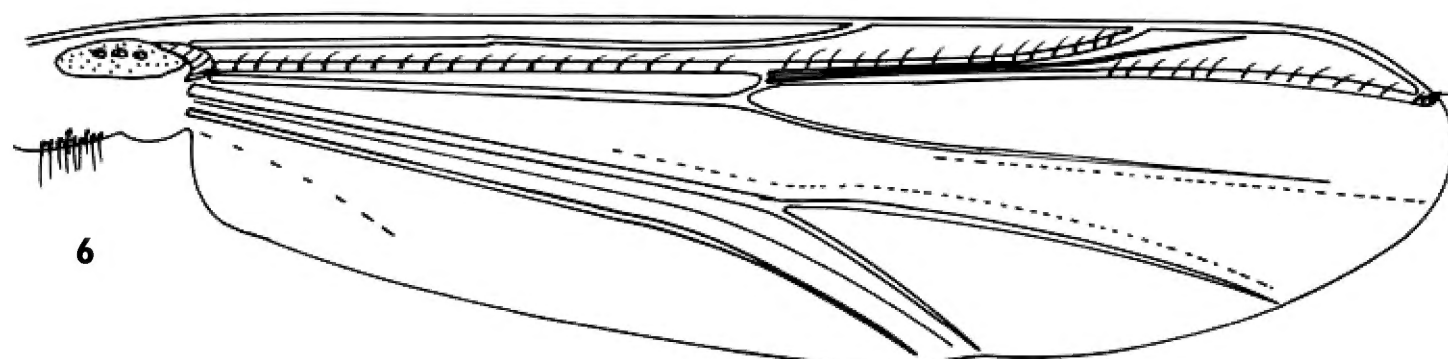
Legs. Fore tibia with rounded scale lacking spur. Spurs on mid tibiae 23–28, 26 μ m and 25–30, 26 μ m long, including combs 20–23, 21 μ m and 15–18, 16 μ m long; spurs on hind tibia 23–28, 26 μ m and 25–30, 27 μ m long including combs 20–23, 21 μ m and 15–18, 16 μ m long. Width at apex of front tibia 58–68, 60 μ m, of mid tibia 58–73, 63 μ m, of hind tibia 63–85, 70 μ m. Lengths (in μ m) and proportions of legs in Table 3.

Hypopygium (Figs 7–8). Anal point 40–50, 45 μ m long, broad, bare. Tergite IX with more than 30 median setae; laterosternite IX with 2–4, 3 setae. Phallapodeme 90–115, 97 μ m long; transverse sternapodeme 40–50, 45 μ m long, laterally narrowed, medially broad, inverted U-shaped. Gonocoxite 165–230, 180 μ m long. Superior volsella 68–77, 70 μ m long, 38–68, 50 μ m wide; pediform, with 11–16 lateral setae. Inferior volsella 138–163, 142 μ m long; elongate, apex bulbiform, with 9–12, 10 apical setae in 2 rows. Gonostylus 180–195, 186 μ m long; slightly curved medially, with 5–7, 6 apical setae along inner margin. HR 0.80–0.90, 0.82; HV 1.83–2.05, 1.87.

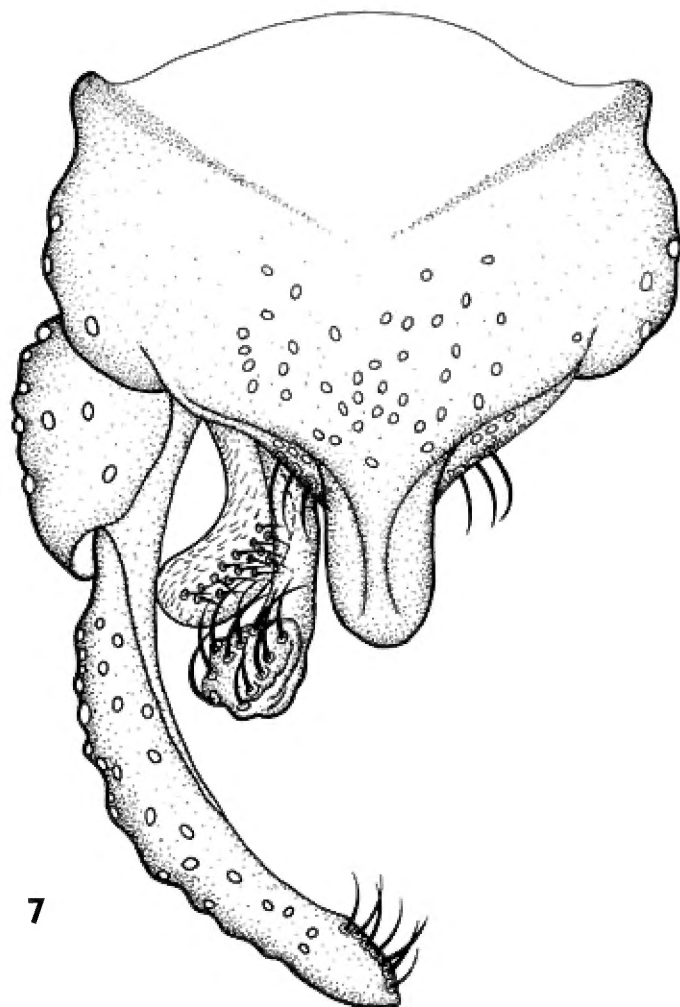
Type materials. Holotype: 1♂, China, Shandong: Taian City, Tai Mountain 36°11.37'N, 117°08.13'E, 25.v.1994, Wang XH, light trap. Paratypes (8): Shandong: 1♂, Taian City, Tai Mountain, 36°11.37'N, 117°08.13'E, 25.v.1994, Wang XH, light trap; Hubei: 2♂♂, Shiyan City, Wudang Mountain, 32°30.22'N, 111°05.09'E, 16.vii.1997, Wang BX, light trap; Zhejiang: 5♂♂, Kaihua County, 29°05.57'N, 118°23.19'E, 13.iv.2011, Lin XL, light trap.

Table 3. Lengths (in μm) and proportions of legs of *Dicrotendipes saetanumerosus* sp. n.

| | P_1 | P_2 | P_3 |
|-----------------|-----------------|-----------------|-----------------|
| fe | 970–1125, 1010 | 840–990, 890 | 950–1125, 1000 |
| ti | 750–780, 760 | 710–840, 750 | 970–1150, 1000 |
| ta ₁ | 1400–1600, 1500 | 390–470, 432 | 620–750, 674 |
| ta ₂ | 650–680, 660 | 220–270, 240 | 310–390, 350 |
| ta ₃ | 525–580, 550 | 150–180, 160 | 260–310, 280 |
| ta ₄ | 450–500, 470 | 90–120, 110 | 150–190, 170 |
| ta ₅ | 225–270, 240 | 70–90, 80 | 90–120, 115 |
| LR | 1.87–1.96, 1.92 | 0.55–0.58, 0.56 | 0.64–0.72, 0.66 |
| BV | 1.73–1.78, 1.76 | 3.48–3.66, 3.54 | 3.00–3.29, 3.14 |
| SV | 1.76–1.95, 1.83 | 2.47–2.76, 2.55 | 4.15–5.01, 4.26 |



6



7



8

Figures 6–8. *Dicrotendipes saetanumerosus* sp. n., male **6** wing **7** hypopygium (dorsal view) **8** hypopygium (ventral view).

Etymology. The species name is from Latin, *saeta*, meaning setae, *numerosus*, meaning numerous, referring to the tergite IX of the species with more than 30 setae, which is unique within the genus.

Remarks. *D. saetanumerosus* sp. n. closely resembles *D. tamaviridis* Sasa, 1981 in the structure of hypopygium, but the new species *D. saetanumerosus* can be separated from *D. tamaviridis* on the basis of following points: (1) the anal point of *D. saetanumerosus* sp. n. is broad and not expanded apically, but the anal point of *D. tamaviridis* is slender and expanded apically; and (2) the tergite IX in *D. saetanumerosus* sp. n. has more than 30 median setae, while *D. tamaviridis* has no median setae and 8–9 setae in the base of anal point.

Distribution. The species is known from Hubei, Shandong and Zhejiang Province of China.

***Dicrotendipes septemmaculatus* (Becker, 1908)**

http://species-id.net/wiki/Dicrotendipes_septemmaculatus

Chironomus septemmaculatus Becker, 1908: 77.

Dicrotendipes pictipennis Kieffer, 1913: 23; Freeman 1955: 22.

Dicrotendipes formosanus Kieffer, 1916: 115; Hashimoto 1981: 12.

Dicrotendipes formosanus var *frontalis* Kieffer, 1916: 116.

Dicrotendipes frontalis: Sublette and Sublette 1973: 403.

Dicrotendipes speciosus Kieffer, 1924: 256; Kieffer 1925: 299.

Dicrotendipes quatuordecimpunctatum (Goetghebuer, 1936): Contreras–Lichtenberg 1986: 710.

Dicrotendipes septemmaculatus: Epler 1988: 42; Wang et al. 1990: 28; Harrison 1993: 363; Spies and Saether 2004: 41.

Specimens examined. China, Hebei: 3♂♂, Qinhuangdao City, 39°55.53'N, 119°36.19'E, 4.vi.1985, Li HH, sweeping method; Guizhou: 2♂♂, Guiyang City, Huaxi, 26°24.32'N, 106°38.58'E, 23.vii.1995, Bu WJ, sweeping method; 1♂, Libo County, Maolan Town, 25°17.21'N, 108°04.28'E, 28.vii.1995, Bu WJ, sweeping method; Shandong: 1♂, Taian City, Tai Moutain, 36°11.37'N, 117°08.13'E, 25.v.1994, Wang XH, light trap; Taiwan: 3♂♂, Taipei City, 25°08.33'N, 121°36.57'E, 21.vii.2003, Wang XH, light trap; Yunnan: 1♂, Wuding County, Shishan Moutain, 25°31.58'N, 102°22.32'E, 8.vii.1986, Wang XH, sweeping method; 1♂, Eryuan County, 26°19.56'N, 100°02.03'E, 18.vii.1986, Wang XH, light trap; 2♂♂, Kunming City, 25°04.09'N, 102°42.14'E, Bu WJ, sweeping method; 2♂♂, Dali City, Yinqiao Town, 25°45.16'N, 100°07.31'E, 22.v.1996, Wang XH, sweeping method.

Remarks. The wing spots are variable in *D. septemmaculatus*. They may be absent in teneral specimens, and the pair of spots in cell r_{4+5} is sometimes combined into one spot. The Chinese specimens have one spot in cell r_{4+5} .

Distribution. China (Hubei, Guizhou, Shandong, Taiwan and Yunnan Province); Algeria; Australia; Burma; Egypt; Bangladesh; India; Indonesia; Japan; Lebanon; Namibia; Nigeria; South Africa; Spain; Sundan; Uganda; Zimbabwe; Zaire.

***Dicrotendipes tamaviridis* Sasa, 1981**

http://species-id.net/wiki/Dicrotendipes_tamaviridis

Dicrotendipes tamaviridis Sasa, 1981: 99; Niitsuma 1995: 444; Wang 2000: 644.

Specimens examined. China, Hubei: 3♂♂, Shiyan City, Wudang Mountain, 32°30.22'N, 111°05.09'E, 16.vii.1997, Wang BX, light trap; Gansu: 1♂, Dingxi City, Min County, 34°26.34'N, 104°02.20'E, 16.v.1993, Yang ZC, light trap; Shaanxi: 1♂, Liuba County, 33°37.16'N, 106°55.12'E, 2.vii.1994, Bu WJ, light trap; Zhejiang: 6♂♂, Kaihua County, 29°05.57'N, 118°23.19'E, 13.iv.2011, Lin XL, light trap.

Remarks. Sasa (1981) described this species based on material from Japan and Niitsuma (1995) described the pupae, larvae and adults. Chinese specimens agree with the adult description of Niitsuma (1995). Some measured differences between the Chinese specimens and the specimens described by Niitsuma (1995) are shown in Table 4.

Distribution. China (Hubei, Gansu, Shaanxi and Zhejiang Province); Japan.

Table 4. Differences between the specimens of China and of Japan

| | Chinese specimens | Japanese specimens |
|-----|-------------------|--------------------|
| TL | 2.94–3.60 mm | 2.5–3.3 mm |
| Ftu | 7.5–10 µm | 3–10 µm |
| AR | 1.85–2.21 | 1.9–2.3 |
| VR | 1.12–1.14 | 0.81–0.92, 0.85 |

Key to males of the genus *Dicrotendipes* in China

- 1 R₄₊₅ without setae *D. nudus* sp. n.
- R₄₊₅ with setae 2
- 2 Small, membranous, triangular flap-like appendages present near base of anal point *D. fusconotatus* (Kieffer)
- Base of anal point without appendages 3
- 3 Inferior volsella deeply bifid apically *D. septemmaculatus* (Becker)
- Inferior volsella with simple apex or apex bulbiform 4
- 4 Tergite IX with median setae 5
- Tergite IX without median setae 6
- 5 Anal point sharply reflexed ventrad; tergite IX with 6–14 setae *D. pelochloris* (Kieffer)

- Anal point not sharply reflexed ventrad; tergite IX with more than 30 setae..
.....*D. saetanumerosus* sp. n.
- 6 Wing with more than 35 setae on R & R₁*D. nervosus* (Staeger)
- Wing with less than 30 setae on R & R₁7
- 7 Superior volsella with 3 short setae; cylindrical, curving outward; apex bare,
expanded*D. flexus* (Johannsen)
- Superior volsella with 9–10 short setae; pediform, apex not expanded
.....*D. tamaviridis* Sasa

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References

- Becker T (1908) Dipteren der Kanarischen Inseln. Mitteilungen aus dem Zoologischen Museum in Berlin 4: 1–180.
- Contreras-Lichtenberg R (1986) Revision der in der Westpaläarktis verbreiteten Arten des Genus *Dicrotendipes* Kieffer, 1913 (Diptera, Nematocera, Chironomidae). Annals of the Natural History Museum of Wien 88/89(B): 663–726.
- Cranston PS, Tee RD, Credland PF, Kay AB (1983) Chironomidae haemoglobins: their detection and role in allergy to midges in the Sudan and elsewhere. Memoirs of American Entomological Society 34: 71–87.
- Dendy JS, Sublette JE (1959) The Chironomidae (= Tendipedidae: Diptera) of Alabama with descriptions of six new species. Annals of the Entomological Society of America 52: 506–519.
- Epler JH (1988) Biosystematics of the genus *Dicrotendipes* Kieffer, 1913 (Diptera: Chironomidae: Chironominae) of the world. Memoirs of American Entomological Society 36: 1–214.
- Freeman P (1955) Chironomidae (Diptera Nematocera). Exploration du Parc National Albert. Mission G. F. de Witte (1933–1935) 83: 3–41.
- Freeman P (1957) A study of the Chironomidae (Diptera) of Africa South of the Sahara. Part III. Bulletin of the British Museum (Natural History) (Entomology) 5: 323–426.
- Freeman P (1961) The Chironomidae (Diptera) of Australia. Australian Journal of Zoology 9: 611–737. doi: 10.1071/ZO9610611
- Frommer SI, Rauch PA (1971) Pupal duration, adult emergence and oviposition periods for midge *Dicrotendipes californicus* (Johannsen) (Diptera: Chironomidae). California Vector Views 18: 33–39.
- Goetghebuer M (1936) Chironomides du Congo Belge. Revue de Zoologie et de Botanique Africaines 28: 453–492.

- Harrison AD (1993) *Dicrotendipes pilosimanus* Kieffer: a description of all life stages, and features which distinguish it from *Dicrotendipes septemmaculatus* (Becker) (Insecta, Diptera: Chironomidae) Annals of the Cape Provincial Museums (Natural History) 18: 357–370.
- Hashimoto H, Wongsiri T, Wongsiri N, Tirawat C, Lewvanich A, Yasumatsu K (1981) Chironominae from rice fields of Thailand with descriptions of 7 new species. Technical Bulletin of Taxonomy Branch, Entomology and Zoology Division, Department of Agriculture, Bangkok 7: 1–47.
- Johannsen OA (1932) Chironominae of the Malayan subregion of the Dutch East Indies. Archiv für Hydrobiologie Supplement 11: 503–552.
- Kieffer JJ (1913) Chironomidae et Cecidomyiidae. In: Alluaud CA, Jeannel R (Eds) Voyage de Ch. Alluaud et R. Jeannel en Afrique orientale (1911–1912). Résultats Scientifiques, Paris, 1–43.
- Kieffer JJ (1916) Tendipedides (Chironomides) de Formose conservés au Muséum National Hongrois de Budapest et déterminés par J. J. Kieffer. Annales Historico-Naturales Musei Nationalis Hungarici 14: 81–121.
- Kieffer JJ (1921) Chironomides des Philippines et de Formose. Philippine Journal of Science 18: 557–593.
- Kieffer JJ (1922) Chironomides de l'Afrique Équatoriale. (2^e partie). Annales de la Société Entomologique de France 91: 1–72.
- Kieffer JJ (1924) Six nouveaux Chironomides d'Afrique. Annales de la Société Scientifique de Bruxelles 43: 255–261.
- Kieffer JJ (1925) Chironomides d'Égypte, (Dipt.). Bulletin of the Entomological Society of Egypte 8: 244–313.
- Lenz F (1937) Chironomariae aus Niederländisch-Indien. Larven und Puppen. Archiv für Hydrobiologie Supplement 15: 1–29.
- Niitsuma H (1995) Three species of the genus *Dicrotendipes* (Diptera, Chironomidae) from Japan. Japanese Journal of Entomology 63: 433–449.
- Sasa M (1981) Studies on chironomid midges of the Tama River. Part 4. Chironomidae recorded at a winter survey. Research Report from the National Institute for Environmental Studies 29: 79–148.
- Saether OA (1969) Some Nearctic Podonominae, Diamesinae and Orthocladiinae (Diptera: Chironomidae). Bulletin of the Fisheries Research Board of Canada 170: 1–154.
- Saether OA (1980) Glossary of chironomid morphology terminology (Diptera: Chironomidae). Entomologica Scandinavica Supplement 14: 1–51.
- Spies M, Saether OA (2004) Notes and recommendations on taxonomy and nomenclature of Chironomidae (Diptera). Zootaxa 752: 1–90.
- Staeger C (1839) Systematisk fortegnelser over de i Danmark hidtil fundne Diptera. Krøyer Naturhistorisk Tidsskrift 2: 549–600.
- Sublette JE (1964) Chironomidae (Diptera) of Louisiana. I. Systematics and immature stages of some lentic chironomids of west-central Louisiana. Tulane Studies in Zoology 11: 109–150.
- Sublette JE, Sublette MF (1973) Family Chironomidae, In: Delfinado M, Hardy ED (Eds) Catalogue of the Diptera of the Oriental Region, Part 1. University Press of Hawaii, Honolulu, 389–422.

- Wang XH, Zheng LY, Ji BC (1990) Note the genus *Dicrotendipes* Kieffer from China (Diptera: Chironomidae). Sichuan Journal of Zoology 9: 28–29.
- Wang XH (2000) A revised checklist of Chironomidae from China (Diptera). In: Hoffrichter O (Ed) Late 20th Century Research on Chironomidae. An Anthology from the 13th International Symposium on Chironomidae. Shaker Verlag, Achen, 629–652.